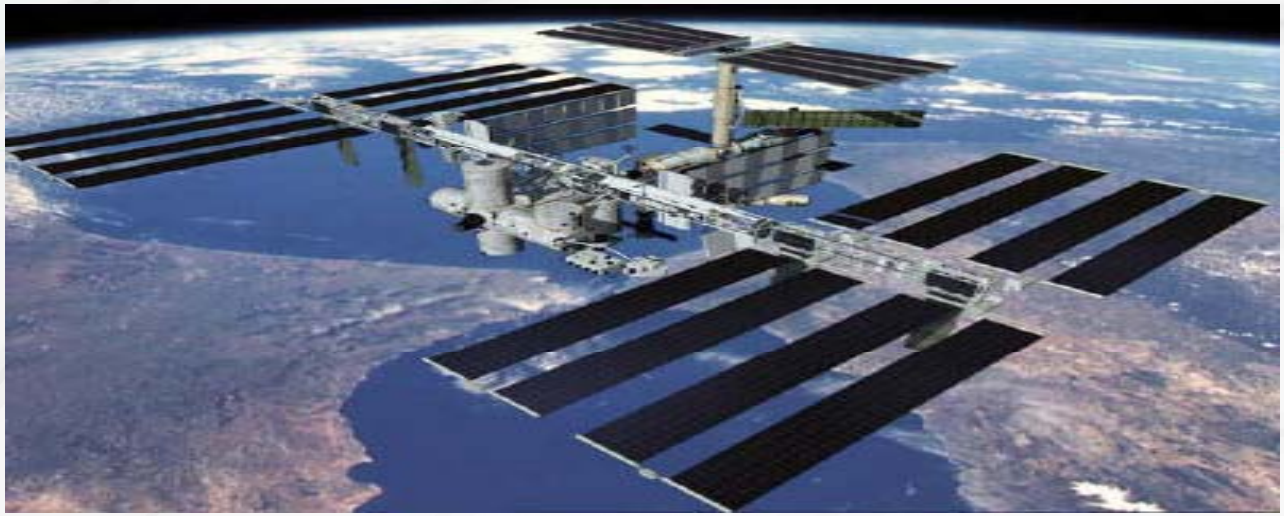
The Importance of Spectrum

William Gerstenmaier

Associate Administrator, Human Exploration and Operations Mission Directorate

September 20th, 2011

Overview

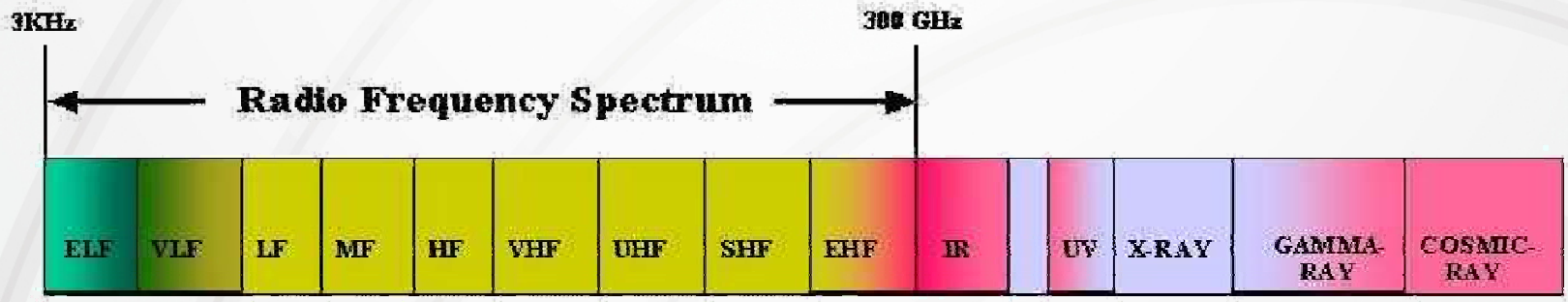


- What is Spectrum?
- Why is Spectrum Important to NASA?
- Key Players (NASA, National, International)
- Spectrum Management Process
- Pressures on Spectrum Access
- Summary

What is Spectrum?

The term **“electromagnetic spectrum”** describes the entire range of radiated energy from low frequency radio waves through visible light radiation and further to gamma and cosmic rays.

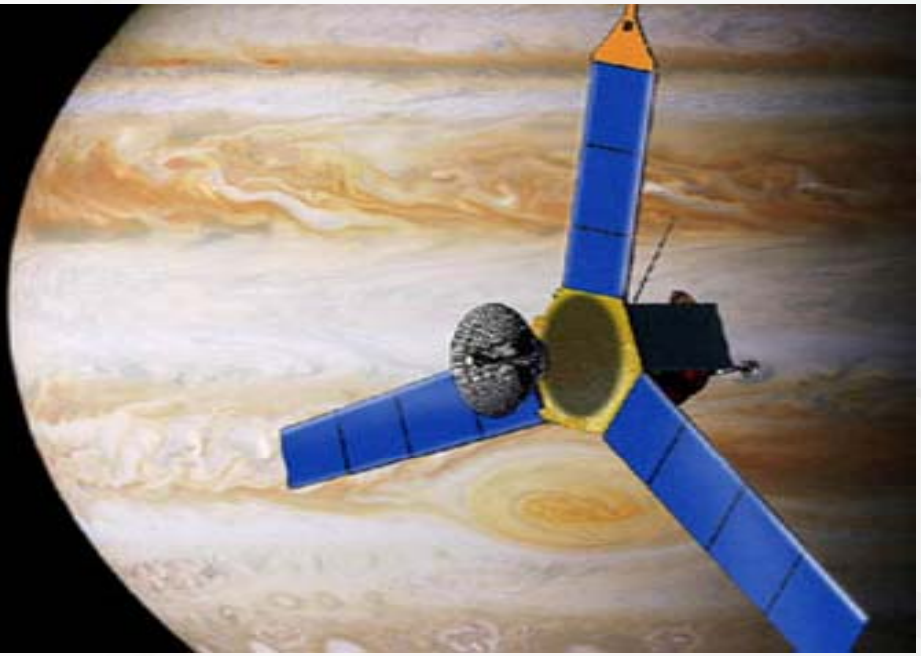
- **Radiofrequency spectrum** is the portion of the Electromagnetic Spectrum most commonly used for radio communications.



Why Is Spectrum Important to NASA?

Virtually every mission undertaken by NASA requires radio spectrum.

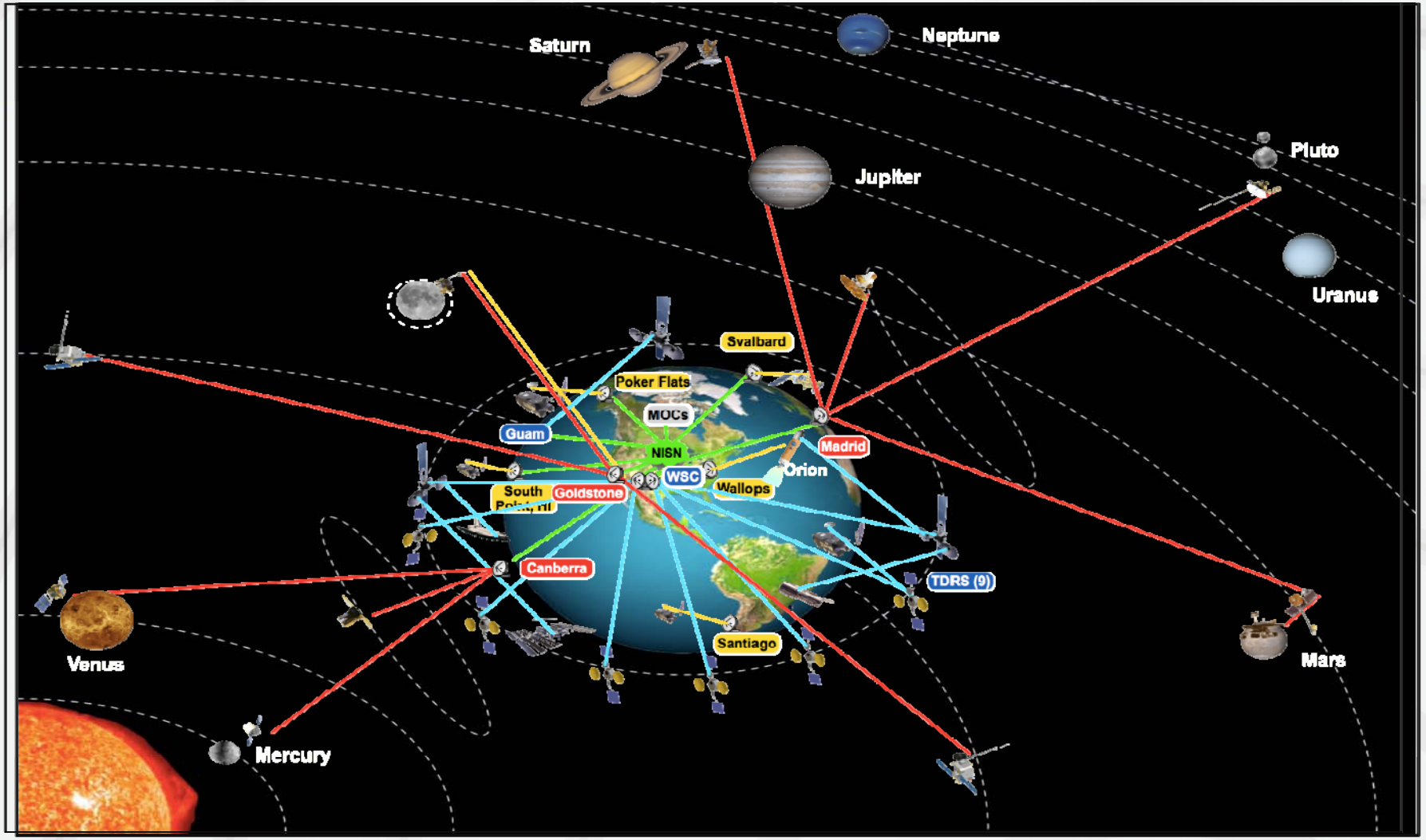
- Earth Science
- Space Science
- Space Exploration
- Aeronautical Research



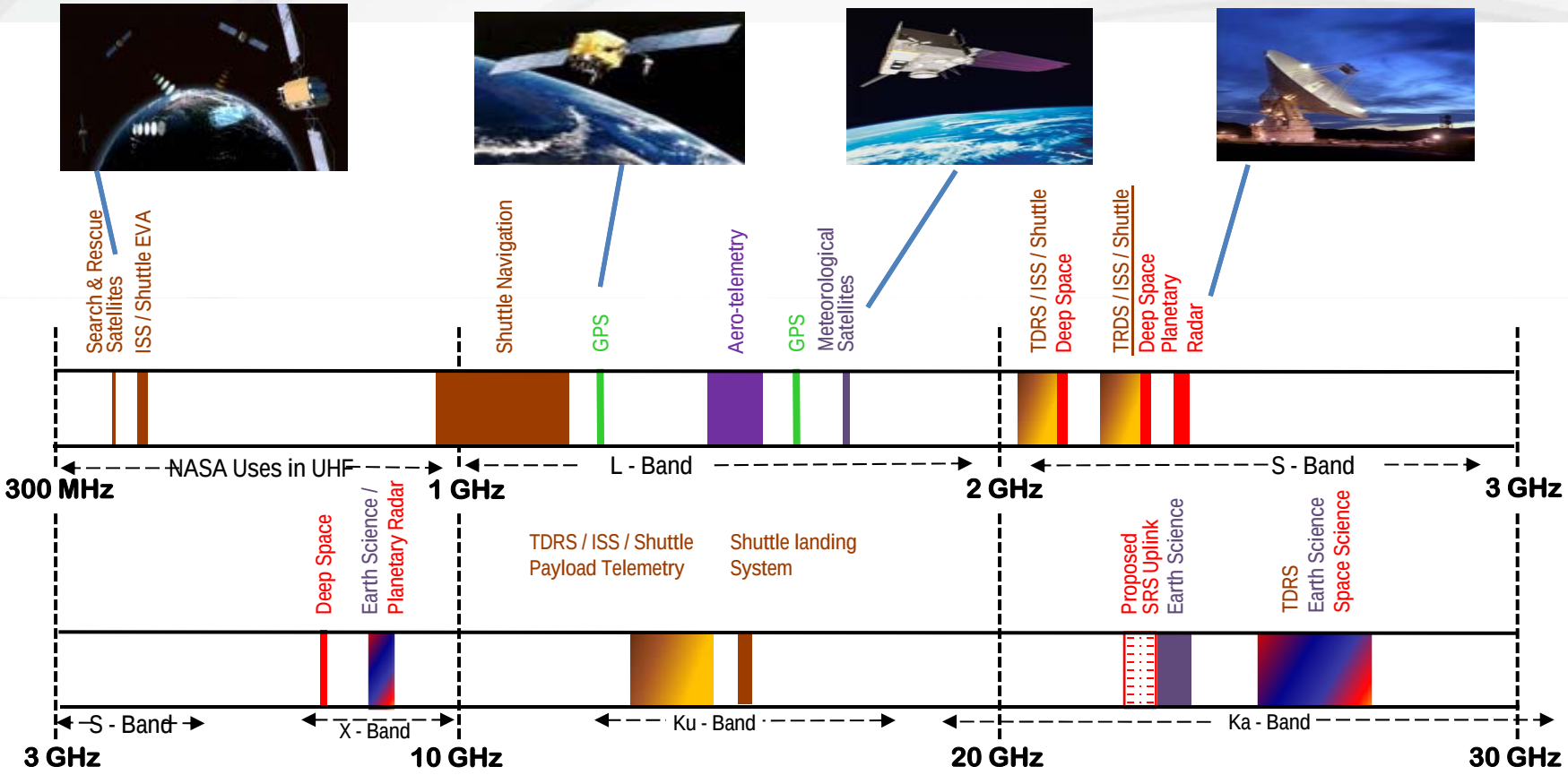
Missions may be:

- Near Earth/Deep Space
- Human/Robotic
- Long Term/Short Term

NASA Space Communications and Navigation Network

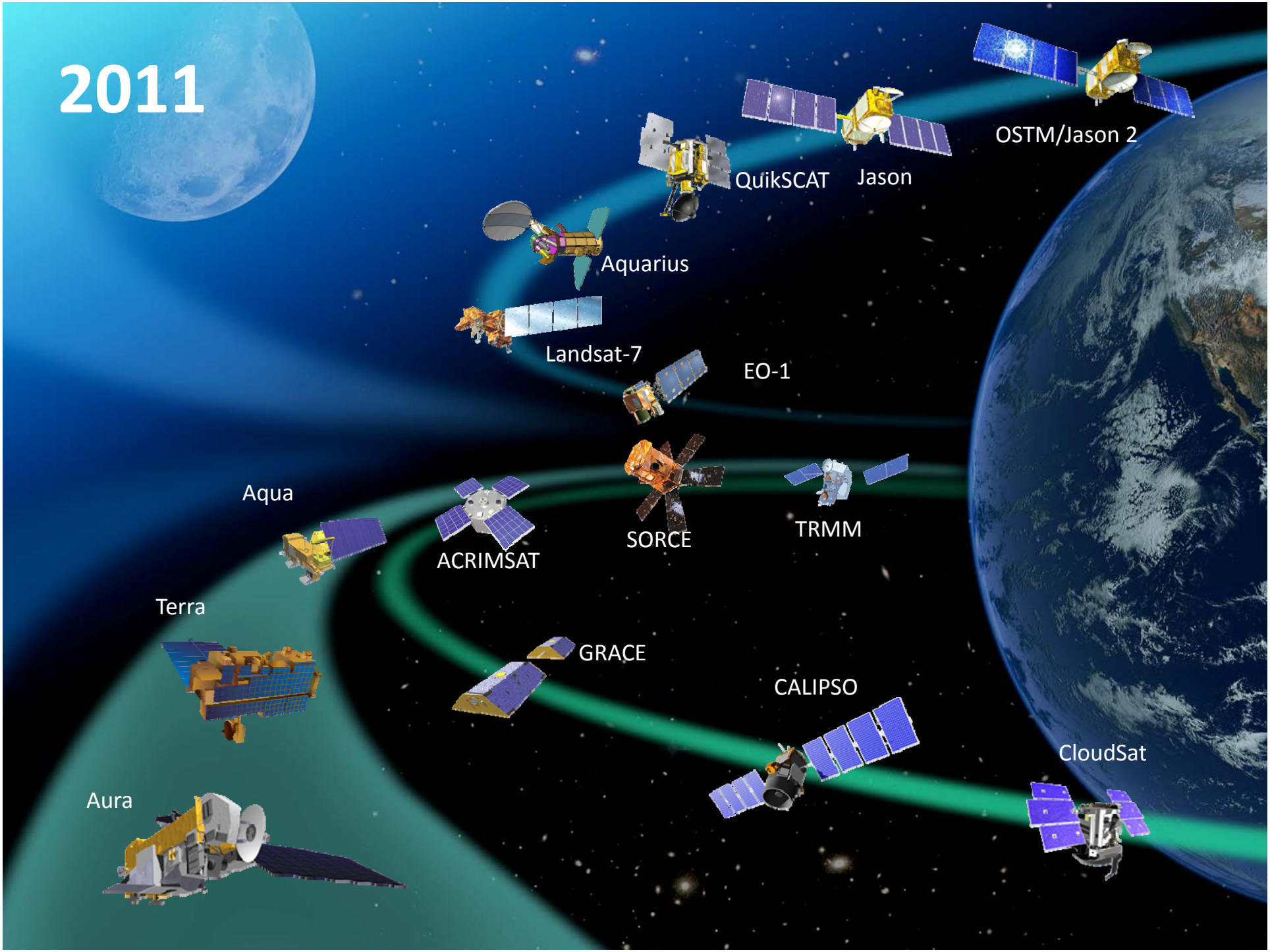


NASA Communications and Navigation Spectrum Use

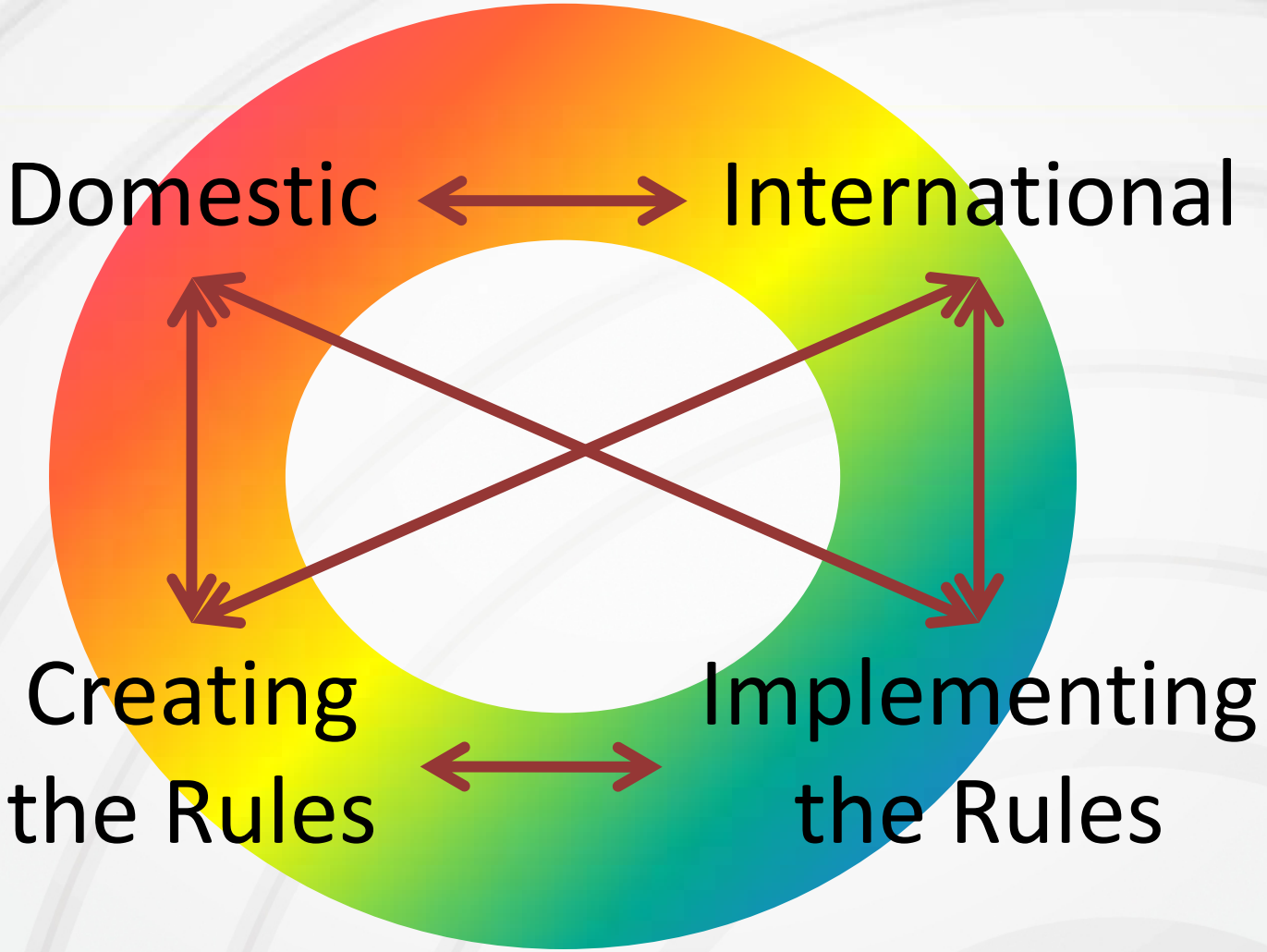


Representative NASA Spectrum Use (300 MHz – 30 GHz)

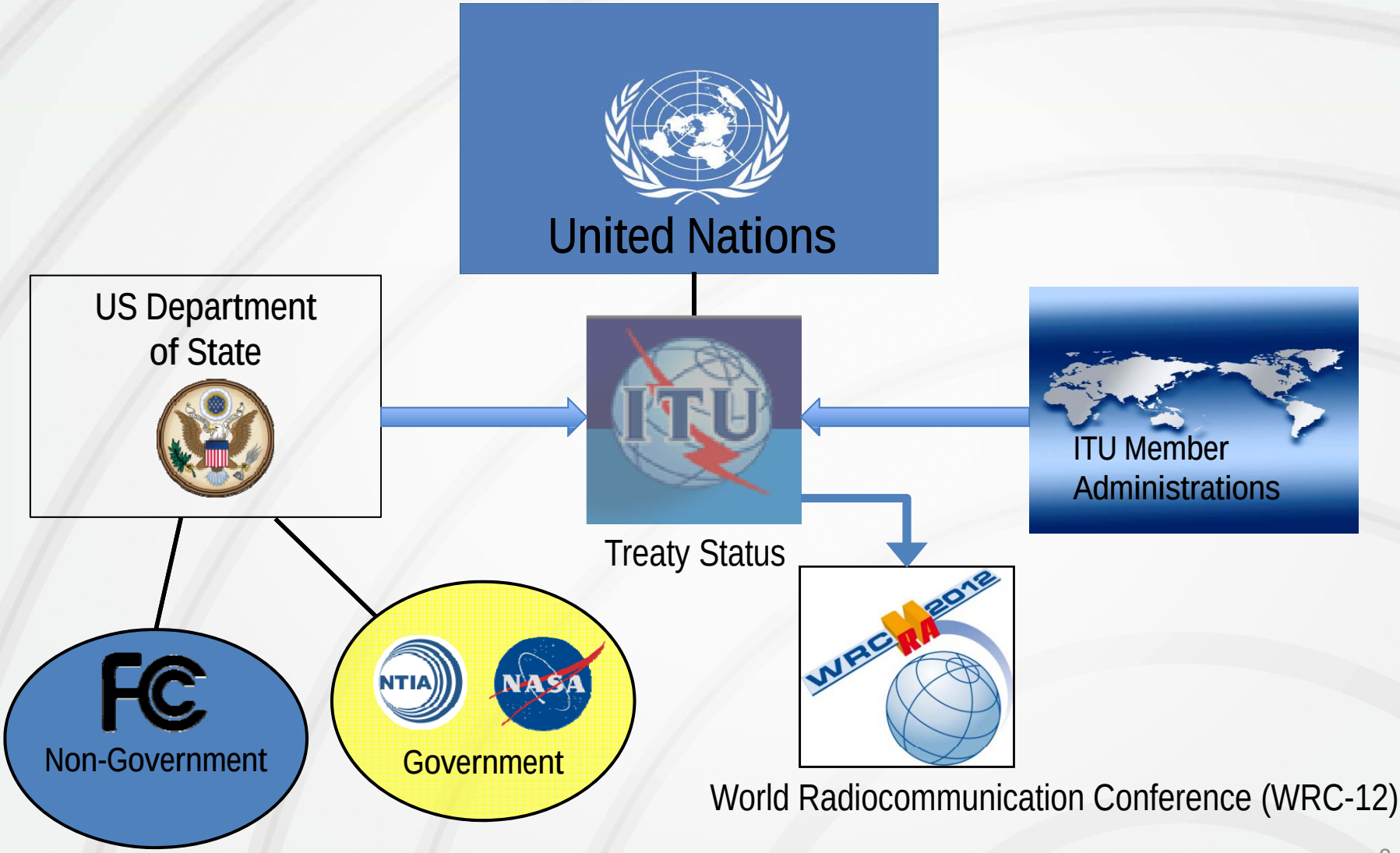
(NASA spectrum use extends to greater than 300 GHz)


2011
OSTM/Jason 2
QuikSCAT
Jason
Aquarius
Landsat-7
EO-1
Aqua
ACRIMSAT
SORCE
TRMM
Terra
GRACE
CALIPSO
CloudSat
Aura

Overview: Spectrum Management



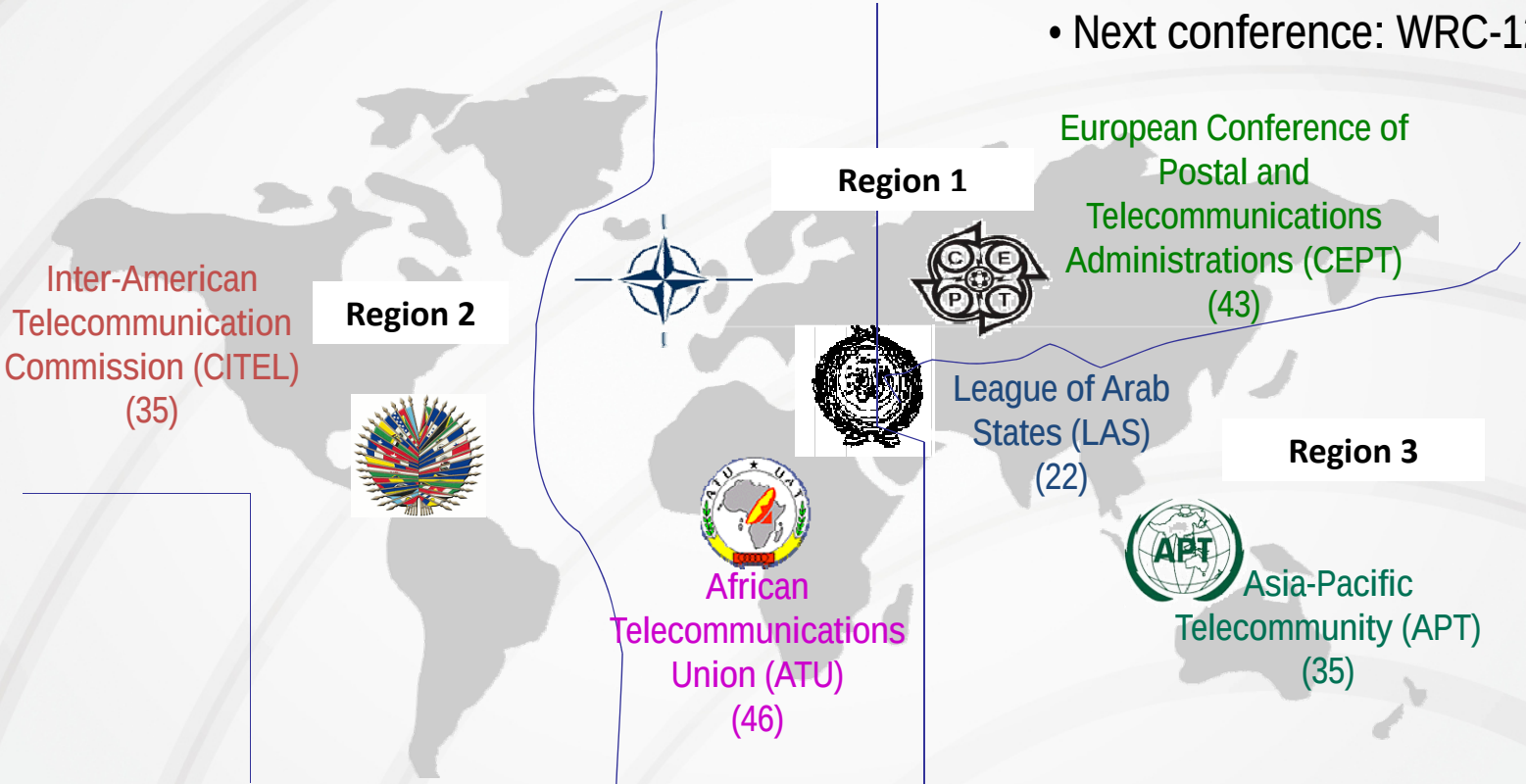
How Is Spectrum Managed? (International)



International Spectrum Players

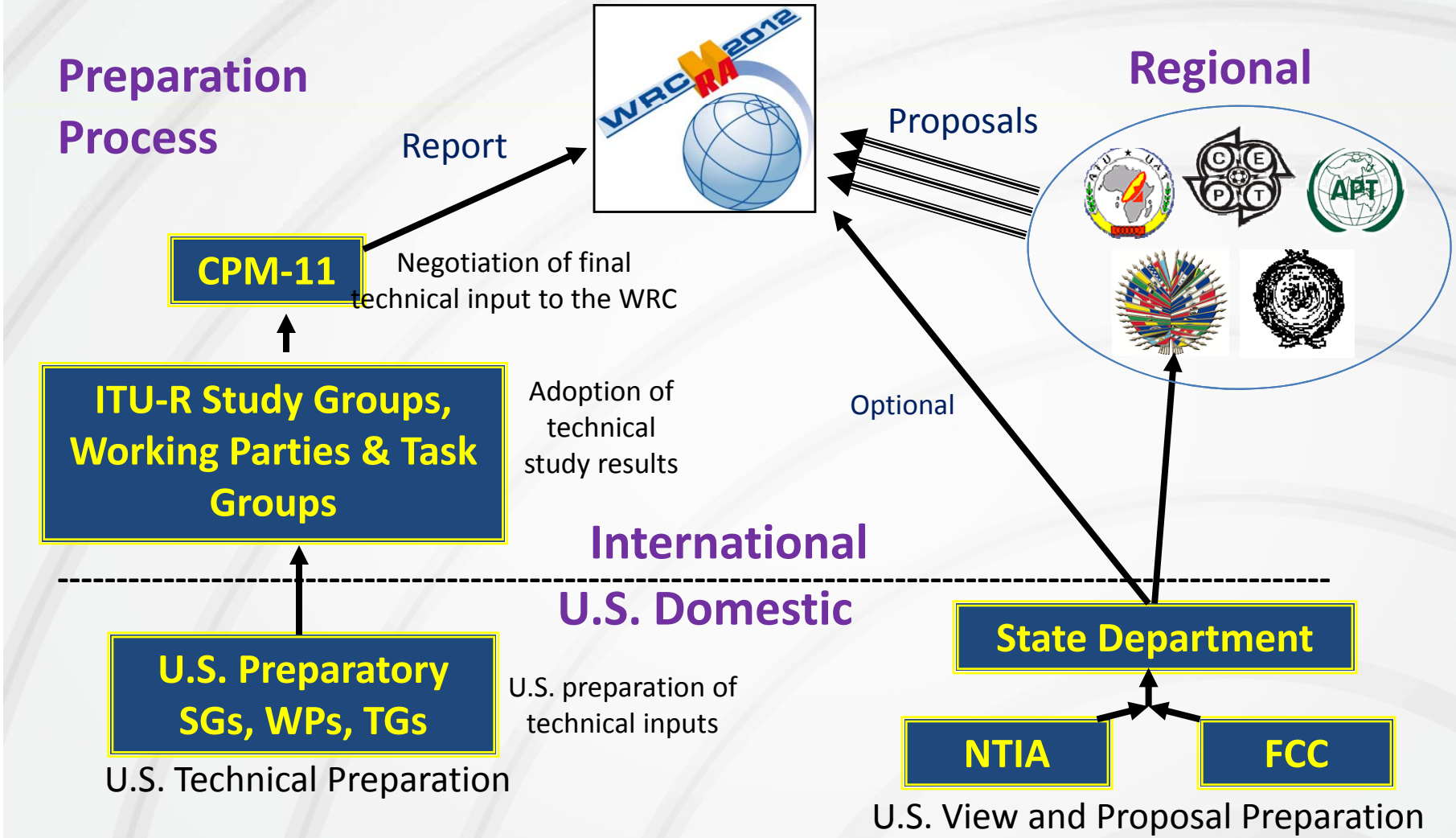
Reviews & Revises Regulations

WRC
- 192 UN Members
- Next conference: WRC-12

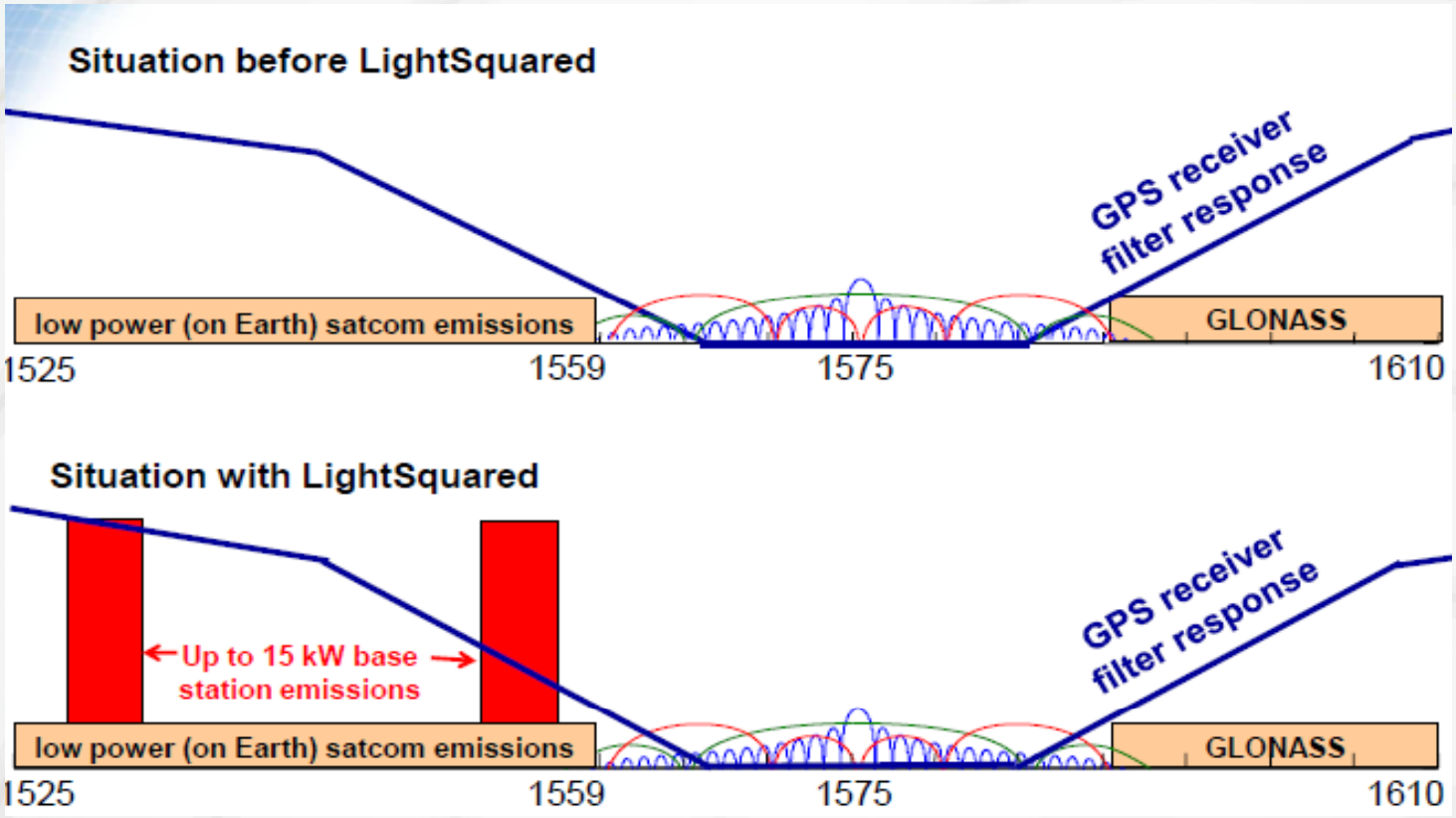


Each nation has sovereignty over the use of its spectrum.

WRC-12


Preparation Process
Report
WRC-12
Proposals
Regional
CPM-11
Negotiation of final technical input to the WRC
ITU-R Study Groups, Working Parties & Task Groups
Adoption of technical study results
Optional
International
U.S. Domestic
U.S. Preparatory SGs, WPs, TGs
U.S. preparation of technical inputs
State Department
NTIA
FCC
U.S. Technical Preparation
U.S. View and Proposal Preparation

LightSquared Issue



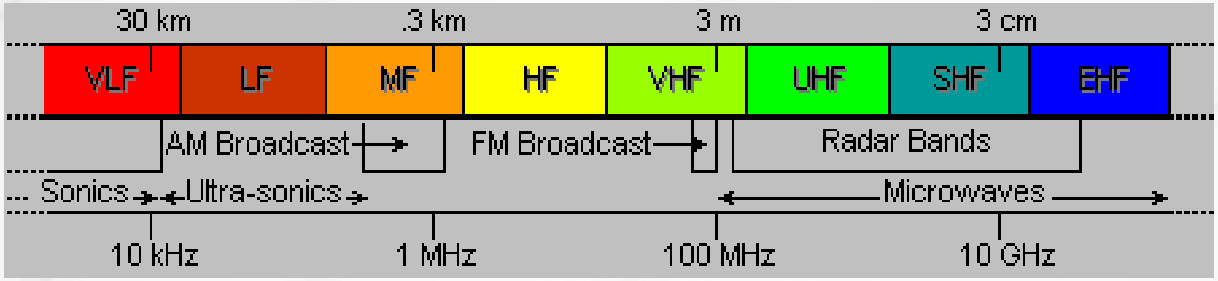
Source: Chris Hegarty, MITRE

Summary

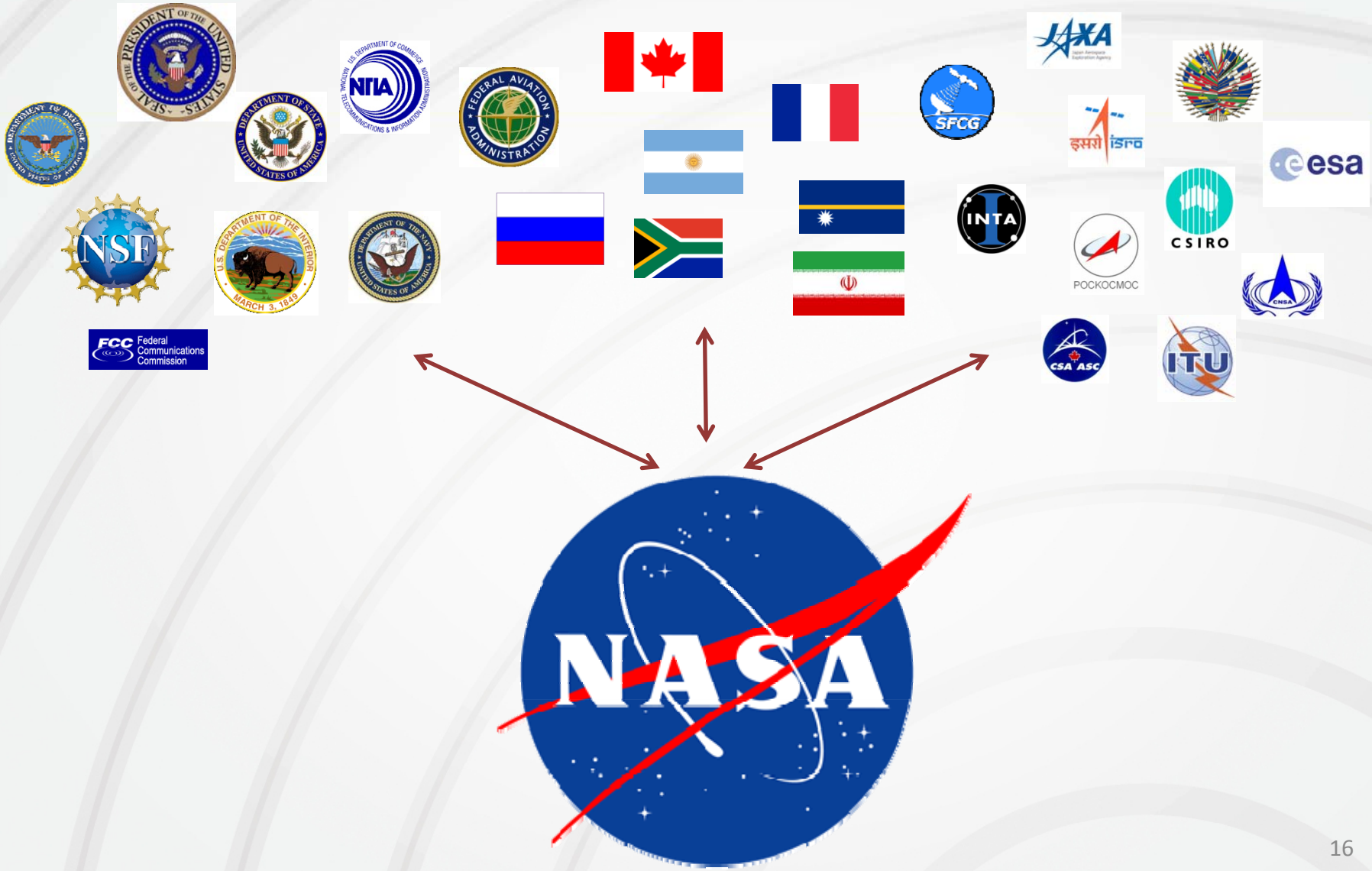
- NASA is:
  - **Continuing collaboration with space faring nations**
  - **Educating and conducting outreach regarding NASA spectrum use**
  - **Continue activities to ensure long term spectrum use for science**

Backup slides

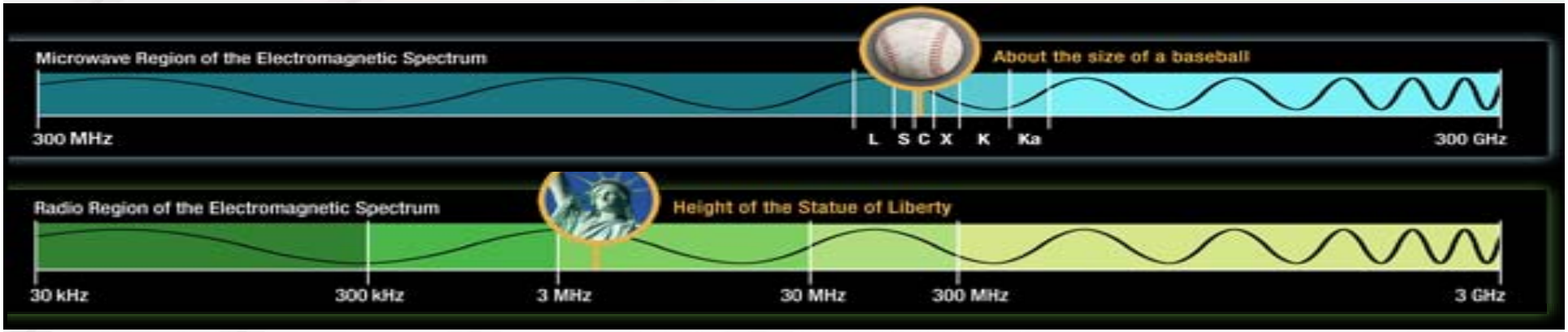
Backup Slides

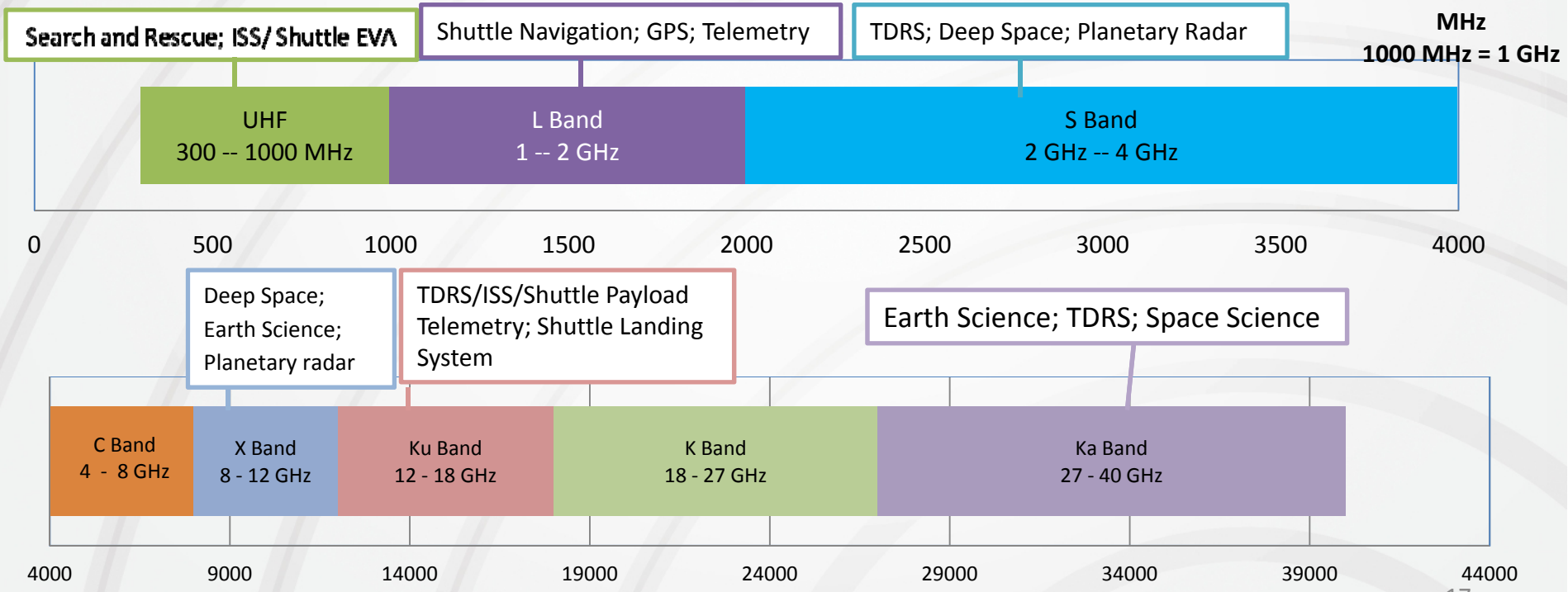


Spectrum Policy "Ecosystem"



Radio Band Designations

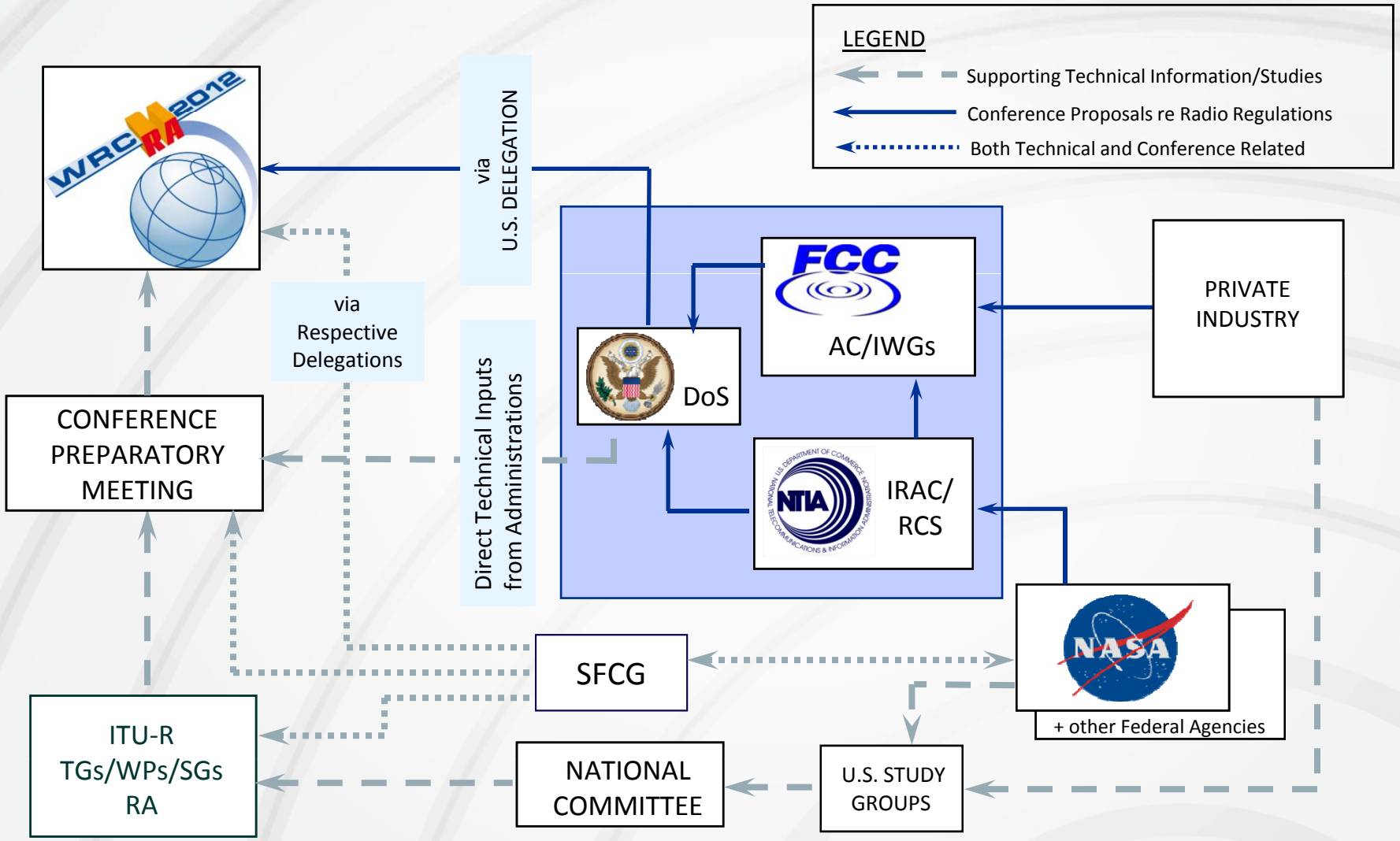




The Global Positioning System

- Baseline 24 satellite constellation in medium earth orbit
- Global coverage, 24 hours a day, all weather conditions
- Satellites broadcast precise time and orbit information on L-band radio frequencies
- Two types of services:
  - Standard (free of direct user fees)
  - Precise (U.S. and Allied military)
- Three segments:
  - Space
  - Ground control
  - User equipment

The Players (International)



Policy Development: International

- Coordinate Policy within International Science Community
- Conduct and Defend Technical Studies in Study Groups and Working Parties in ITU-R
- Develop U.S. Foreign Policy Views, Positions and Proposals
- Gather Regional Support within the Americas
- Negotiate Treaty Level Text on Behalf of U.S.
  - Serve on U.S. Delegation in support of the U.S. State Department at World Radiocommunications Conferences
  - Serve as Spokespersons on behalf of U.S. and/or Regional coalitions of Nations in the Americas

How Is Spectrum Managed? (National)

COMMUNICATIONS ACT OF 1934
(Telecom Act of 1996)

Executive Branch

National Telecommunications and Information Administration (NTIA)

COORDINATION

Legislative Branch

Federal Communications Commission (FCC)

NTIA Chairs IRAC and The Subcommittees

INTERDEPARTMENT RADIO ADVISORY COMMITTEE (IRAC)

20 Departments/ Agencies, including

Private Industry

State and Local Governments

ITU


Structure
ITU
Plenipotentiary Conferences
Council
World Conferences on International Telecommunications
World/Regional Radiocommunication Conferences
Radiocommunication Assemblies
Radio Regulations Board
Advisory Group
Study Groups
World Telecommunication Standardization Assemblies
Advisory Group
Study Groups
World/Regional Telecommunication Development Conferences
Advisory Group
Study Groups
General Secretariat
Secretary-General
Deputy Secretary-General
Director
Director
Director
Radiocommunication Bureau
Telecommunication Standardization Bureau
Telecommunication Development Bureau
Radiocommunication Sector
Telecommunication Standardization Sector
Telecommunication Development Sector